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CRM 87-30 / February 1987

AD-A182 746

# RESEARCH MEMORANDUM

# SUMMARY OF THE ACTIVE/ RESERVE FORCE MIX STUDY

Martha E. Shiells
Jean W. Fletcher

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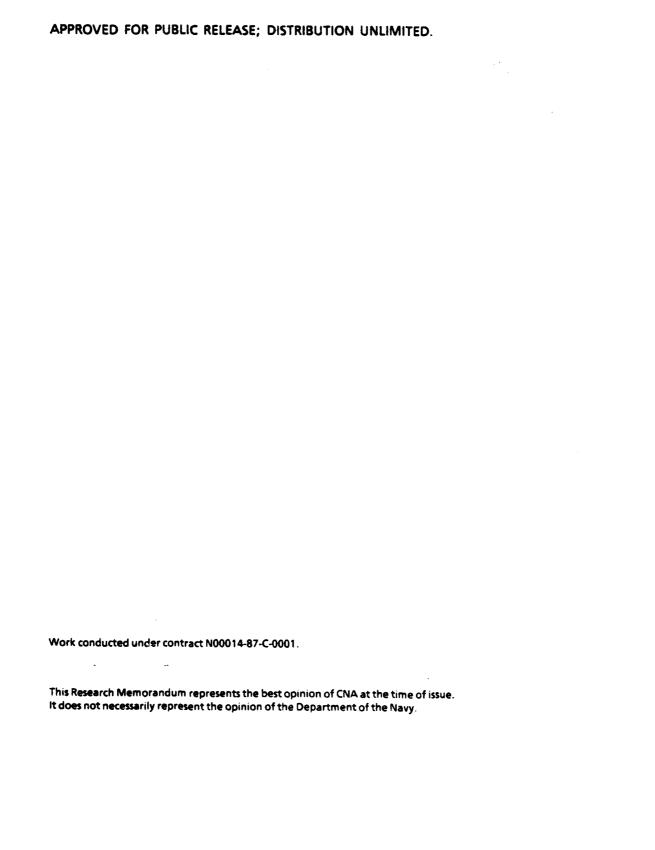SELECTED
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# REPORT DOCUMENTATION PAGE

*AT82746*

| 1a. REPORT SECURITY CLASSIFICATION | 1b. RESTRICTIVE MARKINGS |
|---|---|
| UNCLASSIFIED | |

| 2a. SECURITY CLASSIFICATION AUTHORITY | 3. DISTRIBUTION / AVAILABILITY OF REPORT |
|---|---|
| | Approved for Public Release; Distribution Unlimited. |
| 2b. DECLASSIFICATION / DOWNGRADING SCHEDULE | |

| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) | 5. MONITORING ORGANIZATION REPORT NUMBER(S) |
|---|---|
| CRM 87-30 | |

| 6a. NAME OF PERFORMING ORGANIZATION | 6b. OFFICE SYMBOL (If applicable) | 7a. NAME OF MONITORING ORGANIZATION |
|---|---|---|
| Center for Naval Analyses | CNA | Office of the Chief of Naval Operations (OP-06) |

| 6c. ADDRESS (City, State, and ZIP Code) | 7b. ADDRESS (City, State, and ZIP Code) |
|---|---|
| 4401 Ford Avenue<br>Alexandria, Virginia 22302-0268 | Navy Department<br>Washington, D.C. 20350-2000 |

| 8a. NAME OF FUNDING / ORGANIZATION | 8b. OFFICE SYMBOL (If applicable) | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER |
|---|---|---|
| Office of Naval Research | ONR | N00014-87-C-0001 |

| 8c. ADDRESS (City, State, and ZIP Code) | 10. SOURCE OF FUNDING NUMBERS | | | |
|---|---|---|---|---|
| | PROGRAM ELEMENT NO. | PROJECT NO. | TASK NO. | WORK UNIT ACCESSION NO. |
| 800 North Quincy Street<br>Arlington, Virginia 22217 | 65154N | R0148 | | |

**11. TITLE (Include Security Classification)**

Summary of the Active/Reserve Force Mix Study

**12. PERSONAL AUTHOR(S)**
Martha E. Shiells, Jean W. Fletcher

| 13a. TYPE OF REPORT | 13b. TIME COVERED | | 14. DATE OF REPORT (Year, Month, Day) | 15. PAGE COUNT |
|---|---|---|---|---|
| Final | FROM | TO | February 1987 | 38 |

**16. SUPPLEMENTARY NOTATION**

| 17. | COSATI CODES | | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) |
|---|---|---|---|
| FIELD | GROUP | SUB-GROUP | Active duty, Aviation personnel, Cost estimates, Forecasting, Geographic area, Manpower requirements, Naval personnel, NAVET (Naval Veteran) NRF (Naval Reserve Force), Personnel supply, SELRES (Selected Reserves) Tables (Data) |
| 05 | 09 | | |
| | | | |
| | | | |

**19. ABSTRACT (Continue on reverse if necessary and identify by block number)**

This research memorandum summarizes the analyses conducted for the Active/Reserve Force Mix Study. The availability of personnel to man missions being transferred to the Reserve forces is studied. In particular, this paper examines which homeports will be most able to support the Naval Reserve Force, what determines whether Navy veterans will affiliate with the Selected Reserves, and what the supply will be of aviation officers leaving active duty. Better techniques for estimating the cost savings of Reserve units are developed, and the operating and support costs of aviation units, especially personnel costs, are discussed. Keywords:

| 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT | 21. ABSTRACT SECURITY CLASSIFICATION |
|---|---|
| ☐ UNCLASSIFIED/UNLIMITED  ☒ SAME AS RPT.  ☐ DTIC USERS | Unclassified |

| 22a. NAME OF RESPONSIBLE INDIVIDUAL | 22b. TELEPHONE (Include Area Code) | 22c. OFFICE SYMBOL |
|---|---|---|
| | | |

**DD FORM 1473, 84 MAR**      83 APR edition may be used until exhausted.

All other editions are obsolete      SECURITY CLASSIFICATION OF THIS PAGE

A

4 March 1987

MEMORANDUM FOR DISTRIBUTION LIST

Subj:     Center for Naval Analyses Research Memorandum 87-30

Encl:     (1)  CNA Research Memorandum 87-30, "Summary of the Active/
              Reserve Force Mix Study," by Martha E. Shiells and
              Jean W. Fletcher, February 1987

1.   Enclosure (1) is forwarded as a matter of possible interest.

2.   This Research Memorandum represents the final documentation of a
CNA project requested by the Deputy Chief of Naval Operations (Plans,
Policy and Operations).  It summarizes the analyses conducted for the
Active/Reserve Force Mix Study.  The availability of personnel to man
missions being transferred to the Reserve forces is studied.  In
particular, this paper examines which homeports will be most able to
support the Naval Reserve Force, what determines whether Navy veterans
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CRM 87-30 / February 1987

# SUMMARY OF THE ACTIVE/ RESERVE FORCE MIX STUDY

Martha E. Shiells
Jean W. Fletcher

*Naval Planning, Manpower, and Logistics Division*

| Accession For | |
|---|---|
| NTIS GRA&I | ☒ |
| DTIC TAB | ☐ |
| Unannounced | ☐ |
| Justification | |
| By | |
| Distribution/ | |
| Availability Codes | |
| Dist | Avail and/or Special |
| A-1 | |

# ABSTRACT

This research memorandum summarizes the analyses conducted for the Active/Reserve Force Mix Study. The availability of personnel to man missions being transferred to the Reserve forces is studied. In particular, this paper examines which homeports will be most able to support the Naval Reserve Force, what determines whether Navy veterans will affiliate with the Selected Reserves, and what the supply will be of aviation officers leaving active duty. Better techniques for estimating the cost savings of Reserve units are developed, and the operating and support costs of aviation units, especially personnel costs, are discussed.

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# INTRODUCTION

Selected Reservists are civilians who drill for one weekend every month and who participate in two weeks of Active Duty for Training (ACDUTRA) a year. Because savings are usually expected when responsibilities are transferred to Reserve units, Congress directed the services in 1984 to prepare annual reports outlining how they would provide the National Guard and Reserve with new missions, more modern equipment, and greater integration with the active forces. Congressional pressure to expand the role of the Reserve is particularly great on the Navy because of the already existing manpower demands placed on it by plans to attain a 600-ship Navy. The Navy also uses a lower percentage of Reservists than any other service. In FY 1985, personnel in Reserve components made up 48 percent of the Army's total endstrength, but only 18 percent of the Navy's. The Selected Reserve (SELRES) has grown considerably over the past several years, and it will continue to grow in the near future (see table 1).

The purpose of the Active/Reserve Force Mix Study was to provide analytical assistance to the Navy in preparing its annual Report to the Congress on the Navy's Total Force. In particular, the Navy required more information on when personnel availability might constrain the movement of missions into SELRES. Reserve forces face unique manning problems because of their reliance on local, part-time labor supplies. Further, better techniques were needed for estimating the cost savings of Reserve units. Since the Reserve is a part-time force, Reserve units have lower personnel costs than comparable active-duty units. Operation and maintenance costs may also be lower for Reserve units that have their own ships and planes.

The first section that follows summarizes the work done under this project to forecast the availability of personnel to man new Reserve missions in specific geographical areas. A basic forecasting technique is outlined, along with an application to manning the Naval Reserve Force (NRF). As part of this technique, it is necessary to measure the personnel supply

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## TABLE 1

## NUMBER OF SELECTED RESERVISTS

| Year | Reservists |
|------|-----------|
| 1980 | 87,000 |
| 1981 | 87,000 |
| 1982 | 89,000 |
| 1983 | 94,000 |
| 1984 | 100,000 |
| 1985 | 109,000 |
| 1986 | 117,000 |
| 1987 | 126,000 |
| 1988 | 135,000 |
| 1989 | 139,000 |
| 1990 | 141,000 |
| 1991 | 142,000 |

NOTE: For 1980 – 1985, the figures are yearly
average attained strengths; for 1986 – 1991,
the figures are from the 1987 Presidential
budget request. All figures include all
training categories and both officers and
enlisted personnel.

within 100 miles of a Reserve center. The Claritas data set, which uses zip codes to assign locations to Reserve centers, is described. To forecast accurately the number of Navy veterans (NAVETs) who join SELRES, it is necessary to estimate the determinants of affiliation rates. The method and results of this estimation are discussed. Even if there are insufficient data to forecast the number of SELRES affiliations, some information on manning Reserve units can be obtained by examining the number of persons with the necessary qualifications leaving active duty. This question is addressed in the context of initiatives to increase the number of F-14, F/A-18, and A-6E aircraft in the Reserves.

The second section describes the techniques for comparing the costs of active and Reserve units. Only annual, recurring costs are considered so that a methodology applicable to many different missions can be developed. How personnel cost differentials, including differences in retirement accrual and replacement costs, can be calculated is discussed. Then, a framework for assessing operating and support costs is presented and applied to VP squadrons.

This paper summarizes eight research papers produced during the Active/Reserve Force Mix Study. Details of the analyses are contained in the papers referenced in this document. The original papers should be consulted if the reader is interested in the specific topics.

# GEOGRAPHIC PERSONNEL AVAILABILITY

An important consideration in transferring units to the Selected Reserve is the availability of personnel. SELRES units face unique manning problems because Reservists are part-time, voluntary employees who must train near their homes and who do not have time for extensive training. Reserve units, therefore, must draw on local sources of personnel, and many of these people must be pretrained. Most SELRES members are recruited from within 100 miles of the drill site, implying that supply must be measured in specific geographic areas.

Historically, most Selected Reservists have been Navy veterans. To predict how many NAVETs will affiliate, it is necessary to forecast the number of people leaving active duty and the rate at which they will affiliate. In addition, beginning in 1984 more individuals with no prior military service joined SELRES under the Sea and Air Mariner (SAM) program. Supply forecasts must therefore take SAMs into account.

## MANNING THE NAVAL RESERVE FORCE

One of the most visible areas of SELRES growth is the Naval Reserve Force (NRF). Table 2 shows the programmed additions to the NRF from FY 1985 through FY 1991. By FY 1991, 52 additional ships will be in the Reserve, homeported in as many as 14 locations. Difficulties arise when the Navy tries to match ships to locations. Each ship type requires a different set of occupations, or ratings, and each location has a different distribution of potential personnel supplies across ratings. The CNA study team assessed the ability of each potential homeport area to supply sufficient Reservists to support the NRF program [1]. Only sea-going ratings that are in short supply were included in the analysis, which proceeded as described below.

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## TABLE 2

## ADDITIONAL SHIPS IN THE NAVAL RESERVE
## FY 1985 – FY 1991

| Ship type | Number |
|---|---|
| Naval Reserve Force | |
| Frigates | |
|   FFG–7 | 15 |
|   FF–1052 | 2 |
| Amphibious ships | |
|   LST | 1 |
|   LSD | 1 |
| Mine warfare ships | |
|   MCM | 10 |
| Salvage ships | |
|   ARS | 1 |
| Craft of opportunity | <u>22</u> |
| | 52 |

## Defining Geographical Areas

The geographical area from which Reservists can be drawn is defined as all zip codes within a 100-mile radius around each port. CNA purchased a data set from the Claritas Corporation that gives the zip codes within 100 miles of 426 Reserve centers. The data set and its use in this study are described in [2]. Table 3 lists the fourteen ports that the study examined. Notice that eight of the supply areas intersect, implying that these areas compete for personnel. It was decided to combine intersecting supply areas into one location. Even after this pairing, two locations still intersect — Philadelphia/New York and Newport/Boston. Those zip codes within this intersection were assigned to the closest port.

### TABLE 3

### GEOGRAPHIC SUPPLY AREAS

| Location | Other supply areas intersected |
|---|---|
| Boston, MA | Newport, RI; New York, NY |
| Charleston, SC | |
| Houston, TX | |
| Long Beach, CA | San Diego, CA |
| Mayport, FL | |
| New York, NY | Boston, MA; Newport, RI; Philadephia, PA |
| Newport, RI | Boston, MA; New York, NY |
| Norfolk, VA | |
| Pearl Harbor, HI | |
| Philadelphia, PA | New York, NY |
| Portland, OR | Seattle, WA |
| San Diego, CA | Long Beach, CA |
| San Francisco, CA | |
| Seattle, WA | Portland, OR |

## Identifying Data Sources

Data on the number of NAVETs leaving active duty, taken from the Defense Manpower Data Center (DMDC) retention file, are matched with SELRES accession data, taken from DMDC's Reserve Component Common Personnel Data System (RCCPDS). This procedure allows NAVET affiliation rates to be computed. The affiliation rates used are specific to sea-going ratings, but are aggregated across all geographic areas. As will be discussed later, further work under this study indicated that there are significant differences in affiliation rates between geographical areas. If the affiliation rate differences between census regions from the later study had been incorporated into this analysis, a different ranking of homeports may have resulted. Information on the geographical distribution of NAVET losses by zipcode is taken from the retention file. NAVET continuation rates are also computed using RCCPDS data. Separate continuation rates are used for new accessions and persons previously in SELRES, and both are adjusted for length of service.

Data on non-prior-service continuation behavior are taken from annual personnel inventories in the Inactive Manpower Personnel Management Information System (IMAPMIS) maintained by the Naval Military Personnel Command (NMPC). Additional information on SAM recruits was obtained from COMNAVRESFOR, Code 23 (Recruiting).

All affiliation and continuation rates used are based on historical data from FY 1980 through 1985 and thus reflect past policies on SELRES recruitment, growth, and compensation, as well as past economic conditions. To the extent that future policies and economic conditions differ from the past, these rates will not predict future behavior accurately.

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## Forecasting Personnel Supply

The projected supply of personnel for a given year is the sum of the annual gain of NAVETs, the annual gain of SAMs, and the SELRES inventory retained up to that year. Retention of existing inventories is predicted using cumulative continuation rates for all SELRES personnel. The annual gain of NAVETs in the sea-going ratings is obtained by multiplying predicted active-duty losses from the FAST model by expected affiliation rates. The expected affiliation rates are the historical rates adjusted upward for an anticipated increase in recruiting effort. This initial supply for each year is then projected into the future using continuation rates for new accessions.

SAM accessions are held at 1984 levels of 10,000 per year, distributed geographically in the same proportion as they were in 1984. Since the planned number of SAM accessions has fallen since [1] was written, the supply forecasts in the paper are too high. The ranking of homeports, however, should not be affected. Retention rates from the Ready Mariner program, a predecessor of the SAM program, are used to forecast future SAM supplies.

## Determining Manpower Requirements

Demands from both current and programmed SELRES activities in the homeport area are taken into account. Demand from the NRF program is calculated from ship manning documents for the year in which the number of NRF ships in that area reaches a peak. Demand from existing non-NRF programs is held constant at the number of billets filled in 1984. The analysis was done using the NRF program as of the end of FY 1985, not the current plan that is described in table 2. Changes in the NRF program since that time have decreased peak-year demands for personnel in some homeports. Reference [1] indicated that Pearl Harbor's NRF program would be the most difficult to man, but much of this difficulty is removed under the revised plan. The ranking of the other homeports may also be affected, but should not be altered significantly.

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## Results

For each of ten homeport areas, the demand for SELRES person-nel in the peak year is compared to the expected supply. The main result of the analysis is a ranking of the ten homeport areas by their ability to meet manpower demands. This ranking is given in table 4. The Philadel-phia/New York City, Newport/Boston, and San Diego/Long Beach areas appear to be more than capable of manning their portions of the NRF program. Areas that are predicted to be marginal are Puget Sound, May-port, Charleston, and Galveston/Houston. Finally, Norfolk/Little Creek and San Francisco may experience difficulties in locating enough SERLES personnel. Although [1] and table 4 indicate that Pearl Harbor will have the most difficulty obtaining the necessary personnel, the deletion of a fleet replenishment oiler (AO) from that port should remove the difficulty.

An additional finding is that the SAM program is an important source of future SELRES personnel to man NRF ships. SAM supply is expected to average approximately half of the total future supply. An implication of this prediction is that some of the expected cost savings of the NRF program will be offset by the costs of training the SAM crews.

An implicit assumption in this analysis is that NRF billets are just as attractive to SELRES personnel as non-NRF billets. The top priority given to manning the NRF program means that affiliation rates are high. Retention, however, may be a problem. Retention figures computed by COMNAVRESFOR, Code 20 (Retention), suggest that retention in NRF units is significantly lower than in non-NRF units. Further work is needed to estimate the effect of the NRF program on retention rates and to in-corporate this effect into supply projections. A unit incentive pay policy may be necessary to make NRF billets equally attractive. Without such a policy, the supply projections of this study will be only an upper bound on the future availability of Reservists to man NRF ships.

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## TABLE 4

## RANKING OF HOMEPORTS BY
## PERSONNEL AVAILABILITY

| Rank | Homeport |
|------|----------|
| 1 | Philadelphia/New York City |
| 2 | Newport/Boston |
| 3 | San Diego/Long Beach |
| 4 | Puget Sound |
| 5 | Mayport |
| 6 | Charleston |
| 7 | Galveston/Houston |
| 8 | Norfolk/Little Creek |
| 9 | San Francisco |
| 10 | Pearl Harbor |

NOTE: See text regarding Pearl Harbor's
ranking.

Further work is also needed to incorporate geographic variation in affiliation rates into personnel supply forecasts. The results of the affiliation study indicate that affiliation rates are significantly lower in the Pacific region than in other regions containing NRF homeports. The relative rankings of San Diego/Long Beach, Puget Sound, and other West Coast ports given in table 4 may thus be too high. This geographic variation has implications for setting recruiting goals and administering bonuses.

## AFFILIATION OF NAVY VETERANS

Although [1] demonstrates the importance of SAMs in manning the NRF, the major source of qualified, pre-trained personnel is the pool of recent Navy veterans who live close to a Reserve unit. To forecast the number of NAVETs who will join SELRES, [1] used past, observed affiliation rates as forecasts of future rates. The problem with this approach is that if there is a change in anything that influences accession behavior, future affiliation rates will diverge from historical averages. In particular, market conditions, such as pay and unemployment rates, and personal characteristics, such as age, education, sex, and race, will affect affiliations in any geographic area. To predict future accessions more accurately, it is therefore necessary to estimate the effect of changes in various determinants of affiliation rates.

A technique for estimating the effect of pay on affiliation was developed by the CNA study team [3]. It reveals the importance of adjusting for demand constraints on SELRES accessions. In some ratings over some periods of time, the lack of demand for certain skills may limit the number of affiliations. Reference [3] discusses the constraints imposed by the Reserve Recruiting and Manning Objectives System (RAMOS). It suggests that observations occurring when a rating is closed by RAMOS be omitted from the sample used for estimating pay effects. In reference [4], some preliminary data are examined and it is found that observed affiliation rates are lower in ratings that have recruiting restrictions.

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## The Model

The study team developed an empirical model of the determinants of enlisted NAVET affiliation rates [5]. A feature of the model is the manner in which pay is measured. Total annual drill pay for a certain paygrade and length of service is combined with annual affiliation bonus payments, and this sum is then adjusted for inflation. The implicit assumption is that an extra dollar of pay will have the same effect on the probability of affiliating, whether that extra dollar comes from higher drill pay, higher bonuses, or lower price levels. The model also adjusts for differences in affiliation behavior caused by the lack of demand for certain ratings, and for simultaneity between bonus eligibility and affiliation rates.

The relationship between the probability of affiliating and such determinants as Reserve wages, state unemployment rates, paygrade, high school graduation status, mental group, sex, race, marital status, age, census region of residence, and Navy rating is estimated using a maximum likelihood logit technique. The model is estimated separately for each of 11 rating groups based on one-digit DOD occupational categories (see table 5). To have a consistent measure of affiliation behavior, one-year affiliation rates are used, that is, affiliation occurring within one year of leaving active duty.

## Data

The data used are more recent and more extensive than those that have been available previously. The data set was constructed by finding active Navy losses on the Enlisted Master Records (EMR) and matching them to SELRES affiliations on the Reserve Component Common Personnel Data System (RCCPDS) from FY 1979 to FY 1985. Only regular Navy veterans who are lost near the end of their first term, who are eligible to reenlist, and who are not in demand-constrained ratings are included. Table 6 gives statistics describing the 95,809 NAVETs in the sample.

## TABLE 5
## RATING GROUPS BY ONE-DIGIT DOD
## OCCUPATIONAL CATEGORIES

| 1 | Seamanship | BM*, GMG, QM |
|---|---|---|
| 2 | Electronic equipment repair | AQ, AT, AX, CTM, DS, ET*, FT, MT, ST, TD, TM |
| 3 | Communications/intelligence | AC, AW, CTI, CTO, CTR, CTT, EW, IS, OS, OT, RM*, SM |
| 4 | Medical | DT, HM* |
| 5 | Other technical | AG*, DM, EA, MU, PH |
| 6 | Administrative/clerical | AK, AZ, CTA, DK, DP, JO, PC, PN, RP, SK, YN* |
| 7A | Mechanical equipment repair —Aviation | AB, AD, AE, AM*, AO, AS |
| 7S | Mechanical equipment repair —Surface | BT, CM, EM, EN, GMM, GMT, GS, IC, IM, MM*, MN, OM |
| 8 | Craftsmen | BU, CE, EO, HT*, LI, ML, MR, PM, SW, UT |
| 9 | Service/supply | MS*, PR, SH |
| 10 | Unrated | AN, CN, FN, SN* |

NOTE: The asterisks indicate the largest rating within each group.

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## TABLE 6

## DESCRIPTIVE STATISTICS FOR
## THE NAVET SAMPLE

| | |
|---|---:|
| Number of NAVETs | 95,809 |
| Number of ratings | 75 |
| Average real Reserve wages (1978 $) | 1,136 |
| Average unemployment rate (%) | 7.7 |
| Average age | 23 |
| Percent of NAVETs: | |
|   Affiliating | 16.4 |
|   Eligible for bonus | 13.0 |
|   In paygrade E3 | 13.3 |
|   In paygrade E4 | 49.5 |
|   In paygrades E5 or E6 | 37.1 |
|   Female | 7.6 |
|   Nonwhite | 10.2 |
|   Not high school graduates | 16.3 |
|   In lower mental groups | 26.5 |
|   With home of record in: | |
|     New England | 5.9 |
|     Middle Atlantic | 16.8 |
|     South Atlantic | 13.8 |
|     East North Central | 20.3 |
|     East South Central | 5.2 |
|     West North Central | 8.9 |
|     West South Central | 9.2 |
|     Mountain | 6.3 |
|     Pacific | 13.7 |

## Results

The results indicate that pay has a significant and postive influence on affiliation rates in 6 out of the 11 rating groups, including 5 of the 7 largest groups. A measure of responsiveness to pay is the pay elasticity, which gives the percentage change in affiliation rates that is caused by a 1-percent change in real Reserve wages. The estimated pay elasticities and their significance levels are given in table 7. The range of the significant pay elasticities is from 0.77 for construction ratings to 1.95 for administrative and clerical ratings. These elasticities are similar to those found in studies of active Navy retention.

Another way to measure sensitivity to pay is to calculate what effect the affiliation bonus has on the number of accessions. Estimated affiliation rates were computed for typical NAVETs, first assuming no bonus is paid, and then assuming the current $300 annual bonus is paid. The results for rating group 4 indicate, for example, that the expected affiliation rate for typical first-term hospital corpsmen would be 22 per 100 NAVETs without a bonus. This rate would increase to 27 per 100 with the bonus (see [5], pp. 27-28, for the details of this calculation).

The elasticity with respect to the unemployment rate gives the estimated percentage increase in the affiliation rate given a 1-percent increase in the unemployment rate. Table 7 shows that these elasticities are positive and statistically significant in 10 of the 11 rating groups and range from 0.31 to 0.90. For example, the estimated unemployment rate elasticity for rating group 4, the medical ratings, equals 0.51. If the unemployment rate in 1985 had increased by 10 percent, from 7.2 percent to 7.9 percent, the estimated affiliation rate for a typical NAVET in group 4 would have increased by 5.1 percent. Assuming no bonus is paid, this increase in the unemployment rate would result in 1 extra SELRES hospital corpsman for every 100 typical eligible veterans.

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## TABLE 7

## PAY AND UNEMPLOYMENT RATE ELASTICITIES

| Group | Pay | Unemployment rate |
|-------|-----|-------------------|
| 1 | 1.47** | 0.35** |
| 2 | 1.01** | 0.37** |
| 3 | 0.98** | 0.34** |
| 4 | 1.29** | 0.51** |
| 5 | 0.70 | 0.33 |
| 6 | 1.95** | 0.63** |
| 7A | -0.56 | 0.31** |
| 7S | 0.44 | 0.63** |
| 8 | 0.77* | 0.63** |
| 9 | 0.16 | 0.54** |
| 10 | 0.25 | 0.90** |

*Note:* Two asterisks indicate significance at
the 1-percent confidence level, and
one asterisk, at the 5-percent level.

The effect of geographical region is to shift affiliation rates, but not to change the responsiveness to pay. Affiliation rates seem to be the lowest, and not significantly different, in the East North Central, East South Central, and Pacific regions. The Middle Atlantic region seems to have somewhat higher rates, and the New England, West North Central, South Atlantic, West South Central, and Mountain regions seem to have substantially higher affiliation rates. A test of whether pay elasticities differ between census regions is rejected in 10 of the 11 rating groups.

Of the other affiliation determinants included in the model, the estimated effects of race and sex are the strongest. Both nonwhite and female NAVETs have significantly higher estimated affiliation probabilities. The average female NAVET's affiliation rate is significantly higher than the average male's in 9 of the 11 rating groups. In some cases, typical female veterans are twice as likely to join SELRES as are typical males. The differentials for nonwhites are even larger. The partial effects for nonwhites are significant in 10 of 11 rating groups.

The results for paygrade suggest that more rapid advancement during active duty increases the chances of SELRES membership. It was also found that in some cases accession behavior varies between ratings within occupational groups, even after adjusting for measurable differences in the economic opportunities, personal characteristics, paygrade mix, and regional distribution of the NAVETs in the ratings. None of the other variables included in the analysis had significant effects on affiliation rates in more than three of the rating groups.

This study indicates that changes in regular military compensation and affiliation and reenlistment bonuses will influence the Navy's ability to attract and retain SELRES members. Also, periods of high inflation rates or low unemployment rates will make the SELRES recruiting environment more difficult. Although they are outside the scope of the study, support is ient by analogy to such policy tools as unit incentive pay for NRF units and

Selective Reenlistment Bonuses for Training and Administration of Reserve (TAR) personnel.

The results also indicate that in forecasting affiliation rates, changes in the regional, rating, sex, and racial composition of the pool of eligible NAVETs should be taken into account. The results in this paper therefore should be of use in models that forecast SELRES strength attainability by rating and geographical area.

## AVIATION OFFICER LOSSES

Even if there are insufficient data to forecast the number of SELRES affiliations, some information on manning Reserve units can be obtained by examining the number of persons with the necessary qualifications leaving active duty. When there is a need for officers with specific qualifications, the number of active-duty losses may not be sufficient to attain SELRES requirements. This question was addressed by the study team in the context of initiatives to increase the number of F-14, F/A-18, and A-6E aircraft in the Reserves [6].

The majority of Navy Selected Reserve officers have been drawn from the pool of recent active-duty losses. Therefore, information concerning the number and geographic location of appropriately qualified pilots and Naval Flight Officers (NFOs) leaving active duty each year is an important consideration in planning for new and existing Reserve aviation units. Data on the national supply of aviation officers are available from the Officer Master Files (OMFs) maintained by NMPC. Since the OMF records do not contain any reliable data on location upon leaving active duty, it was not possible to estimate potential supply in different regions of the country.

Total aviation officer losses for FY 1981 to FY 1984 were obtained by matching subsequent year's September OMFs. The resulting aviation losses are given in table 8.

## TABLE 8

## AVIATION OFFICER LOSSES

| Fiscal year | Total losses | |
|---|---|---|
| | Pilot | NFO |
| 1981 | 826 | 230 |
| 1982 | 792 | 195 |
| 1983 | 668 | 222 |
| 1984 | 630 | 232 |

The losses in table 8 were further disaggregated to find pilots and NFOs available to SELRES with specific aviation qualifications. Officers not recommended for recall, who had served long enough to qualify for retirement, or who held a rank above commander were excluded. Those holding additional qualification designators indicating experience in A-4, A-6, or A-7 aircraft were assumed to be qualified for A-6s and A-7s. Experience with the F-4, F-14, or F/A-18 was taken as qualification for the F-14. Finally, since the F/A-18 is a relatively new aircraft type, the number of officers leaving active duty with direct experience would be small. Therefore, any officer with attack or fighter aircraft experience was considered for the F/A-18 with the understanding that the pilots would require further training. Table 9 presents the total losses available to SELRES by aircraft qualification type.

## TABLE 9

## AVIATION OFFICER SUPPLY TO SELRES
## BY AIRCRAFT QUALIFICATION TYPE

| Fiscal year | A-6 or A-7 Pilot | A-6 or A-7 NFO | F-14 Pilot | F-14 NFO | F/A-18 Pilot |
|---|---|---|---|---|---|
| 1981 | 62 | 23 | 25 | 31 | 89 |
| 1982 | 52 | 15 | 19 | 19 | 71 |
| 1983 | 46 | 12 | 31 | 20 | 77 |
| 1984 | 42 | 5 | 25 | 20 | 67 |

This study shows that relatively few officers with appropriate and recent experience in F-14, A-6E, and F/A-18 communities leave the Navy each year. There is a trend toward declining active losses from 1981 through 1984, but increases in the number of resignation letters being submitted indicate that this trend may be reversed. It appears that qualified officers may not available at all locations.

# COST-COMPARISON TECHNIQUES

One of the primary motivations for increasing the reliance on the Naval Selected Reserve was anticipated cost savings from transferring missions from active to SELRES manning. In general, both active and Reserve units contain the same number of people. The different mix of full-time and part-time people provides one element of their inherent cost differences. Because of the higher proportion of part-time people and restrictions on their deployment time, Reserve units have lower activity levels than their active counterparts. This lower operational level provides another element of their lower operating costs.

The objective of the cost analyses for this study was to develop a methodology for comparing the costs of active and Reserve units. Differences in the geographic location and structuring of the Reserve unit and in the timing of the mission transfer can make large differences in how costly a new Reserve activity will be. Given the difficulty in generalizing cost-comparison procedures when many of the details of implementing potential transfers are unknown, the study effort concentrated on annually recurring costs. In particular, differences in personnel costs and in operating and support costs that vary with operating tempo were analyzed.

Several qualifications should be kept in mind regarding the cost-comparison methodologies developed under this study. First, only annually recurring costs are considered. The costs of constructing and modifying bases and facilities to accommodate new Reserve initiatives could, however, be enormous relative to annual operating and support costs. By not including start-up costs in the calculations, the cost of expanding the Reserves is underestimated. Second, SELRES manning of an activity implies a lower operational level, requiring explicit recognition that dollars spent on manning an activity with Reservists are buying a different military capability. Issues of the readiness and military capability are not addressed in this study but are of obvious importance. Third, Reserve units may

require increased support from Intermediate Maintenance Activities (IMAs) and other active units. Although increased costs of this nature should be estimated and subtracted from expected Reserve unit savings, this was not done because of the lack of data. Finally, the cost differentials should be considered valid only for small changes in the active/Reserve force mix. Large substitutions of Reserve for active units would reduce the cost differentials because of increasing costs of obtaining the extra Reservists, as well as costs associated with adminstrative changes.

## PERSONNEL COSTS

Comparing the personnel costs of active and Reserve units involves not just comparing basic pay and allowances, but also assessing differences in the mix of full-time and part-time billets, retirement accrual, other direct personnel costs, and such indirect support costs as replacement costs. The study team made several assumptions in accounting for these costs [7]. How much Reserve units will save depends to a large extent on how many part-time, or SELRES, people can be used. In active units, from 85 to 98 percent of the billets are for full-time personnel. Reserve units have a smaller proportion of full-time billets, though the mix differs widely depending on the type of unit. NRF ships, for example, have full-time complements of 55 to 60 percent, whereas the full-time complements of Reserve aircraft units vary from 25 to 40 percent. The full-time people in these Reserve units are either active duty (USN), or Training and Administration of Reserves (TARs).

Annual per-capita cost factors were developed for three classes of personnel: USN, TAR, and SELRES. Within these classes, distinctions were made between officers and enlisted personnel, and persons qualified to receive flight or sea pay. The cost factors were computed by dividing budget justifications by average personnel strengths, both taken from the FY 1985 budget. Direct costs considered include all pay and allowances and

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retirement accrual. Indirect support costs include medical and welfare, base operations, and replacement training.

For persons not rated to receive flight or sea pay, SELRES pay and allowances were 16 percent of active pay and allowances for enlisted personnel and 17 percent for officers. Expected retirement costs are much lower for SELRES than for active duty, however, because Reservists are less likely to earn enough points to qualify for retirement pay. When this is taken into account, the direct personnel costs of a SELRES as opposed to an active-duty billet fall to 12 percent for enlisted and 13 percent for officers.

Replacement costs depend on how many people are lost each year and on how much it costs to recruit and train replacements. Reference [7] presents estimates of turnover rates for the various classes of personnel. The major determinant of the cost of recruiting and training a replacement is whether the person has had prior military service. Traditionally, the Reserve used a much higher percentage of prior-service recruits and thus had lower per-capita replacement costs. This source of savings has lessened with the increasing influence of the SAM and Officer SAM (OSAM) programs. Other indirect costs, such as medical and welfare activities and base operations, have also increased for Selected Reservists as a result of the SAM and OSAM programs.

## OPERATING AND SUPPORT COSTS

The analysis developed standardized procedures for calculating operating and support (O&S) costs under active and Reserve manning [8]. The methodology was illustrated with an application to VP squadrons. A unique feature of the methodology is the manner in which indirect support costs are attributed to units. Also, the advances in comparing personnel costs discussed above are incorporated. Adjustments are made for

reductions in costs related to the lower operating tempo of Reserve units. Furthermore, some of the stated costs of the Reserve units may be costs that are incurred to train Reservists who will augment existing active-duty units upon mobilization. The cost of this training should be assessed to the active unit, and this refinement is included in the cost calculations in [8].

Operating and support cost components are displayed in table 10. An important difference between SELRES and active-duty personnel costs is their retirement costs. Retirement accruals are calculated as a function of base pay: 52 percent for active and TAR personnel, 8 percent for SELRES personnel. These percentages are more representative of the true actuarial payout rates than the 51 percent used for all forces in the FY 1985 budgets.

For many types of missions, some components of equipment operation and maintenance will be lower in Reserve units because of their lower operational levels. To estimate the effect on costs, it is better to use actual rather than programmed operating tempos. For example, average flying hours for Reserve P-3 squadrons were found to be only two-thirds of the average flying hours for active squadrons. Adjustments are made for the costs of fuel consumption and activity rate-related failures based on the differences in flying hours.

An important consideration in calculating differences in personnel replacement costs is to use the best available estimates of turnover rates and recruiting and training costs. A large difference in replacement costs between active and Reserve units results from the larger percentage of prior-service personnel used by the Reserve components. Prior-service personnel do not need recruit training or A-school training and are not as expensive to recruit. The SAM and OSAM programs, however, reduce the percentage of previously trained people being acquired by SELRES and reduce the accompanying cost savings. In FY 1983, Reserve enlisted accessions included 8 percent non-prior-service (NPS) personnel, whereas almost 34 percent of the accessions in FY 1985 were NPS. Similarly, the percentage of NPS

## TABLE 10

## OPERATING AND SUPPORT COST CATEGORIES

Direct costs
  •Personnel
    —Pay and allowances
    —Permanent change of station and travel
    —Retirement accrual
  •Equipment operation and maintenance
    —Fuel
    —Spare parts
    —Training ordnance
    —Modifications

Indirect support costs
  •Base operating support
  •Medical and welfare
  •Personnel replacement
  •Depot maintenance

personnel in officer accessions grew from 18 percent in FY 1983 to 21 percent in FY 1985.

A final adjustment that may be necessary in comparing active and Reserve unit costs is to allow for SELRES augmentees to active units that train with the Reserve unit. The costs associated with these billets should be added to the costs of the active squadron being augmented and subtracted from the Reserve squadron doing the training.

The result of applying the cost methodology to the VP squadrons is that the annual O&S costs of a Reserve VP squadron are only 44 percent of the costs of an active squadron. The Reserve squadrons' lower costs should be viewed with some caution, however. Some of the lower costs (for example, costs for training ordnance) may reflect past neglect of Reserve funding rather than inherent differences. Furthermore, the 56-percent cost savings is based on the full-time/part-time mix and operating tempos of active and Reserve VP squadrons. Reserve units with different characteristics will have different cost savings. Finally, the lower O&S costs of the Reserve units may be offset by the initial costs of establishing the units, by differences in readiness and military capability, or by increased demands for maintenance or other support from active units.

# CONCLUSIONS

This study produced the following major findings and recommendations:

- The ability to man the NRF program varies by homeport area. Philadelphia/New York City, Newport/Boston, and San Diego/Long Beach are best able to fulfill SELRES requirements, whereas Norfolk/Little Creek and San Francisco are expected to have the most difficulty.

- Approximately one-half of the total future NRF personnel supply will be Sea and Air Mariners (SAMs). An implication of this is that some of the cost savings expected from the NRF program will be offset by the costs of training the SAM crews.

- Projections of NRF manning depend on retention being the same in NRF and non-NRF billets. Unit incentive pay may be necessary to make NRF billets equally attractive. Further study of geographic and unit differences in retention is necessary.

- Compensation is an important determinant of how many Navy veterans affiliate with SELRES. The results of this study suggest that Reservists respond to changes in compensation in ways that are similar to their active-duty counterparts. The use of such policy tools as affiliation bonuses and unit incentive pay is therefore supported. Pay elasticities that will allow the effects of these policies to be estimated are presented. Although no study was made of Training and Administration of Reserves (TARs), if TARs respond to pay in the same way that both Reservists and persons on active duty have been shown to, then by analogy paying Selective Reenlistment Bonuses to TARs will increase their accession and retention rates.

- Since there are significant differences in accession behavior, predictions of affiliation rates should take into account changes in the regional, rating, sex, and racial composition of the pool of eligible

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NAVETs. The results of this study will be of use in models that forecast SELRES strength attainability by rating and geographical area.

- Economic conditions such as high inflation rates or low unemployment rates make the SELRES recruiting environment more difficult. Measures of the responsiveness of SELRES accessions to changes in unemployment rates are presented.

- When new SELRES missions involve using officers with special qualifications, counting the number of such officers leaving active duty may tell whether SELRES requirements are attainable. This calculation indicates that it may be difficult to man new air missions because there are so few officers leaving active duty who are qualified to fly certain modern aircraft.

- In comparing the annual personnel costs of active and Reserve units, it is important to allow for differences in the mix of full- and part-time billets, retirement accrual rates, turnover rates, and the costs of recruiting and training replacement personnel. The SAM and OSAM programs have decreased the proportion of previously trained recruits entering the Reserves and have thus increased SELRES replacement costs.

- Reserve units that can be expected to have larger savings relative to active units are those that can fulfill their missions with a higher percentage of part-time personnel and that can do so while maintaining a lower operational level. Lower annual operating and support costs of Reserve units may be offset by the initial costs of establishing Reserve units, by differences in readiness and military capability, or by increased demands for maintenance or other support from active units.

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